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POSITION-SENSITIVE RADIATION DETECTOR,(U)
JUL 77 M A ITSKOVSKIY, L S KREMENCHUGSKIY

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POSITION-SENSITIVE RADIATION DETECTOR

by

M. A. Itskovskiy, L. S. Kremenchugskiy,
S. K. Sklyarenko

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POSITION-SENSITIVE RADIATION DETECTOR

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А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere. When written as ë in Russian, transliterate as yë or ë. The use of diacritical marks is preferred, but such marks may be omitted when expediency dictates.

GREEK ALPHABET

Alpha	A	α	*α*	Nu	N	ν	
Beta	B	β		Xi	Ξ	ξ	
Gamma	Γ	γ		Omicron	O	ο	
Delta	Δ	δ		Pi	Π	π	
Epsilon	E	ε	*ϵ*	Rho	P	ρ	*ϱ*
Zeta	Z	ζ		Sigma	Σ	σ	ς
Eta	H	η		Tau	T	τ	
Theta	Θ	θ	*ϑ*	Upsilon	T	υ	
Iota	I	ι		Phi	Φ	φ	*ϕ*
Kappa	K	*κ*	κ *ϰ*	Chi	X	χ	
Lambda	Λ	λ		Psi	Ψ	ψ	
Mu	M	μ		Omega	Ω	ω	

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English
sin	sin
cos	cos
tg	tan
ctg	cot
sec	sec
cosec	csc
sh	sinh
ch	cosh
th	tanh
cth	coth
sch	sech
csch	csch
arc sin	$\sin^{-1}$
arc cos	$\cos^{-1}$
arc tg	$\tan^{-1}$
arc ctg	$\cot^{-1}$
arc sec	$\sec^{-1}$
arc cosec	$\csc^{-1}$
arc sh	$\sinh^{-1}$
arc ch	$\cosh^{-1}$
arc th	$\tanh^{-1}$
arc cth	$\coth^{-1}$
arc sch	sech^{-1}
arc csch	csch^{-1}
rot	curl
lg	log

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POSITION-SENSITIVE RADIATION DETECTOR

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The invention is related to the position-senitive and servo radiation converters which have recently become increasingly more popular in electrooptical equipment.

There are two types of photoelectric position-sensitive devices: the electric bridge, which is a combination of optical, electrical and mechanical elements, and the radiation detector with coordinate-dependent sensitivity.

The second type of device is more promising than the first, since it has a short time lag and is very compact.

The problem with photoelectric position-sensitive devices which operate at room temperature is their limited spectral characteristic, caused by the red boundary of the photceffect. Their sensitivity is limited to the visible and near infrared regions of the spectrum.

The purpose of this invention is to broaden the spectral range of their operation while increasing cocrdinate sensitivity and speed. In order to do this, a pyroelectric crystal with a solid irradiated electrode on one side and one or several point electrodes on the opposite side of the crystal is used as the detection element.

The figure shows a schematic diagram of the pyroelectric position-sensitive detector.

The position-sensitive detector consists of a pyroactive crystal in the form of plane-parallel plate 1, which is irradiated by solid electrode 2. This solid electrode is a layer of silver upon which an absorptive coating layer 3 has been applied, e.g., gold black. The opposite (point) electrode is a disk 50 μm in diameter. Triglycine sulfate single crystals from the "y"-section or polarized barium

titanate ceramics approximately 100 μm thick are used as the pyroactive material. The sensing element is protected from electromagnetic fields and mechanical effects by a permalloy housing with a viewing window made of a material which is transparent in the spectral range in question.

The operating principle of the pyroelectric position-sensitive detector is as follows.

The modulated radiation flux in the form of the focused optical system of a narrow beam is absorbed by the layer of black and causes local heating of the pyroactive crystal. The change in the crystal's temperature generates polarized charges which vary with the modulation frequency to originate on the surface of the crystal, resulting in the manifestation of voltage between the upper solid and lower point electrodes.

The required coordinate-sensitive dependence can be obtained by varying the thickness of the irradiated electrode and the modulation frequency.

The main features of the detector are:

1) the voltage-watt sensitivity with the maximum sensitivity at

a modulation frequency of 20 Hz is 2000 V/W;

2) under the conditions set forth in P. 1, the sensitivity threshold is $5-10^{-9}$ W/Hz;

3) the time constant is $10^{-5}-10^{-6}$ s;

4) the spectral range of sensitivity is 0.5-40 μm when using gold black.

This position-sensitive detector can be used in any part of the electromagnetic spectrum.

Subject of Invention

This invention is a position-sensitive radiation detector which consists of a detector, a viewing window which is transparent in the spectral range in question, a screening housing, and electrical leads. It differs in that in order to broaden the spectral range of the device's operation and raise its coordinate sensitivity and speed, the sensing element is made from a pyroactive crystal, e.g., pyroactive barium titanate ceramics.

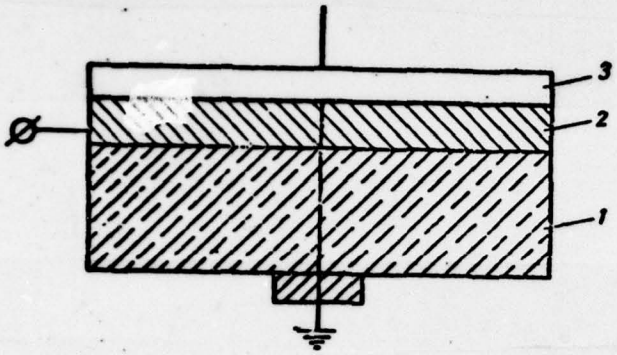

Figure.

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